



# ***JPRS Report***

## **Soviet Union**

***USA: ECONOMICS, POLITICS, IDEOLOGY***  
*No 1, January 1991*

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# Soviet Union

## USA: ECONOMICS, POLITICS, IDEOLOGY

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### Perspectives of Transparency

914K0016A Moscow SSHA: EKONOMIKA, POLITIKA, IDEOLOGIYA in Russian No 1, Jan 91 (signed to press 28 Sep 90) pp 14-25

[Article by Aleksandr Vladimirovich Kaffka, graduate student at Institute of U.S. and Canadian Studies; Sergey Konstantinovich Oznobishchev, candidate of historical sciences and senior scientific associate at the same institute; and Sergey Mikhaylovich Rogov, doctor of historical sciences and institute department head]

[Text] The present stage in world politics is distinguished by the transformation of the entire system of intergovernmental relations: from deterrence, presupposing mutual intimidation, to a balance of the interests of all sides. In addition to the specific issues demanding resolution in the near future (for example, the guarantee of stability at a time of radical reductions of armed forces and arms), there are more general issues of a conceptual nature, connected with the move to a qualitatively new system of international security based on political methods of settling disputes rather than on military strength.

The very term "security" implies a situation in which threats to the vital interests of the state and society are absent or have been neutralized. In today's interdependent world these threats are not only of a military nature. The system of military confrontation between the USSR and the United States and between the Warsaw Pact and NATO, which was established during the "cold war," was based on the credibility of "deterrence," or a retaliatory strike at a potential aggressor. This credibility was achieved through the accumulation of military strength and by displays of willingness to use this strength to protect one's interests.

Today international friction is being radically diminished, and the participants in this process are assuring each other of the absence of aggressive intentions, but their accumulated military potential, despite the first steps toward its reduction, is still far in excess of defense needs. It will take a long time before the weapons allowing a country to launch a sudden attack on the other side, and to wage a protracted large-scale military conflict, will be eliminated.

Today it is extremely important to surmount the mechanism of military confrontation instead of simply lessening military tension. The new security framework should be based not on the credibility of threats to the other side, but on the verifiable absence of threats. This will require the establishment of institutions to achieve the maximum predictability of the behavior of the sides in the military sphere, confidence in each other's capabilities and intentions, and the demilitarization of intergovernmental relations.

**It is time to review the aims and objectives of the arms reduction process and conduct a new analysis of its prospects, its possible patterns and goals, and its role and**

**place in the structure of international relations in the near future.** This process could be viewed as a non-traditional method of coordinating interests in the security sphere and a gradual move toward joint decision-making during the period of transition from hostility to cooperation.

It appears that there are three separate groups of disarmament problems, or, because their resolution has followed a specific sequence, three stages of this process.

In the military-technical sphere, the **first stage** is arms control in its present form. This is the partial limitation and reduction of existing armed forces and arms, extremely limited confidence-building measures corresponding to the low level of international cooperation, and the appropriate procedure of verification, primarily with the aid of so-called national technical means. This was the nature of, for example, the SALT-I agreement of 1972.

The **second stage** represents a qualitatively new level of cooperation, distinguished by a move to joint decision-making in the military-technical sphere and the coordination of plans for the deployment of new generations of weapons. The ABM and SALT-II treaties and the treaty now being drafted on strategic offensive arms, for example, envisage reductions and also stipulate the types and quantities of systems that can and cannot be deployed in the future.

We can assume that during the **third stage** it will be possible to dismantle not only the mechanism of military confrontation, but also the potential for it, on the basis of joint oversight of the development and production of new types of weapons with the aim of military conversion. Elements of this approach are present in the treaty prohibiting nuclear tests in the three spheres and the INF Treaty. They are still limited and incomplete, however. The need for predictability should lead to the quantitative and qualitative growth of this kind of interaction. In particular, joint tests of weapons systems, conventional and strategic, could become a form of cooperation during this stage.

As a matter of fact, the very term "arms control" is already an inaccurate description of the purpose of interrelations in the military sphere during this stage. The term "military coordination" might be more applicable. This move from confrontation to cooperation will be distinguished by the quantitative and qualitative broadening of access to information about one another and the stronger possibility of mutual predictability in various spheres of military activity, which is covered in general by the term "transparency."

In reference to old and new elements of defense policy, USSR Minister of Foreign Affairs E.A. Shevardnadze said that "the perpetuation of the ideas of nuclear deterrence predetermines not only the exaggeration of national rights and interests at the expense of commitments, but also a shortage of confidence. This problem has to be addressed.

"Is there a way out of this vicious cycle? Yes, it is the affirmation of glasnost and openness and the establishment of a diversified infrastructure of pervasive verification. If there is a need to deter one another, let this be transparent and verifiable deterrence."<sup>1</sup>

### Transparency Framework

There are two interpretations of transparency, which could be called "narrow" and "broad."

Transparency in the military-political sphere, in the narrow sense of the term, was implied in the context of the talks on mutual balanced reductions of armed forces and arms in Central Europe since the 1970s, signifying a specific framework of relations between states and military forces. This framework should be created through the mutual offer of verifiable information about the scales, types, and nature of military activity.

We have invested the term "transparency" with an indisputably broader meaning. It is accessibility, or openness, distinguished in general by a new political and psychological framework of non-confrontational interaction between states in an interdependent and multipolar world. This includes one of the elements of the narrow interpretation of transparency—the necessary military-technical factor of political cooperation for the sake of mutual predictability.

The logical development of the mechanisms and structure of intergovernmental agreements will necessitate changes in the bases of political relations between states and the establishment of these mechanisms and structure on a different system of common interests. The openness and accessibility involved in this process will bring about qualitative changes in the pattern of intergovernmental relations—from hostility to cooperation—on the basis of predictable behavior.

**Transparency in reference to the new stage of world politics can be described in the most general terms as the kind of framework of interaction by states that is achieved by taking a group of measures to ensure the maximum**

**predictability of their intentions and capabilities, the mutual elimination of the "enemy image," and the perception of one another as reliable and trustworthy partners in strengthening international security.**

The possibility of the transition to the transparency framework should be viewed as a result of deideologization and the intensive search for optimal and practical solutions to international problems, particularly in the sphere of common security—from military to ecological. The move to transparency can be made through several joint advisory bodies and, in the more distant future, also through decisionmaking bodies, which will gradually take charge of the coordination of all security-related efforts, which are now virtually unilateral and are made without any consideration for the opinions of partners.

The transparency framework in the interdependent world must contain and employ mechanisms of military coordination, including joint decisions on military-technical matters and the parallel conversion of military production, and bodies responsible for military safety from a possible outside threat (third countries, international terrorism, etc.) and for non-military security—ecology, drug addiction, AIDS, etc.—and securing each side's accurate perception of the actions of partners. The complete establishment of this framework is a long-term process, and the progression toward it will include several stages (see Diagram 1).

One of the key elements of progression to the transparency framework is its connection with verification measures. As we have already observed, the strong requirement for verification in today's treaty-negotiation process corresponds to the generally low level of mutual trust between countries, and this is why so much importance is attached to verification measures at the present time. The probability of deception during the first stage, before joint decisionmaking mechanisms have been established, is still quite strong. As the level of transparency rises in line with the development of political cooperation, the need for costly means of control and verification should diminish, although a certain minimum level of expenditures on verification should be maintained (see Diagram 2).

Diagram 1. Transparency Framework

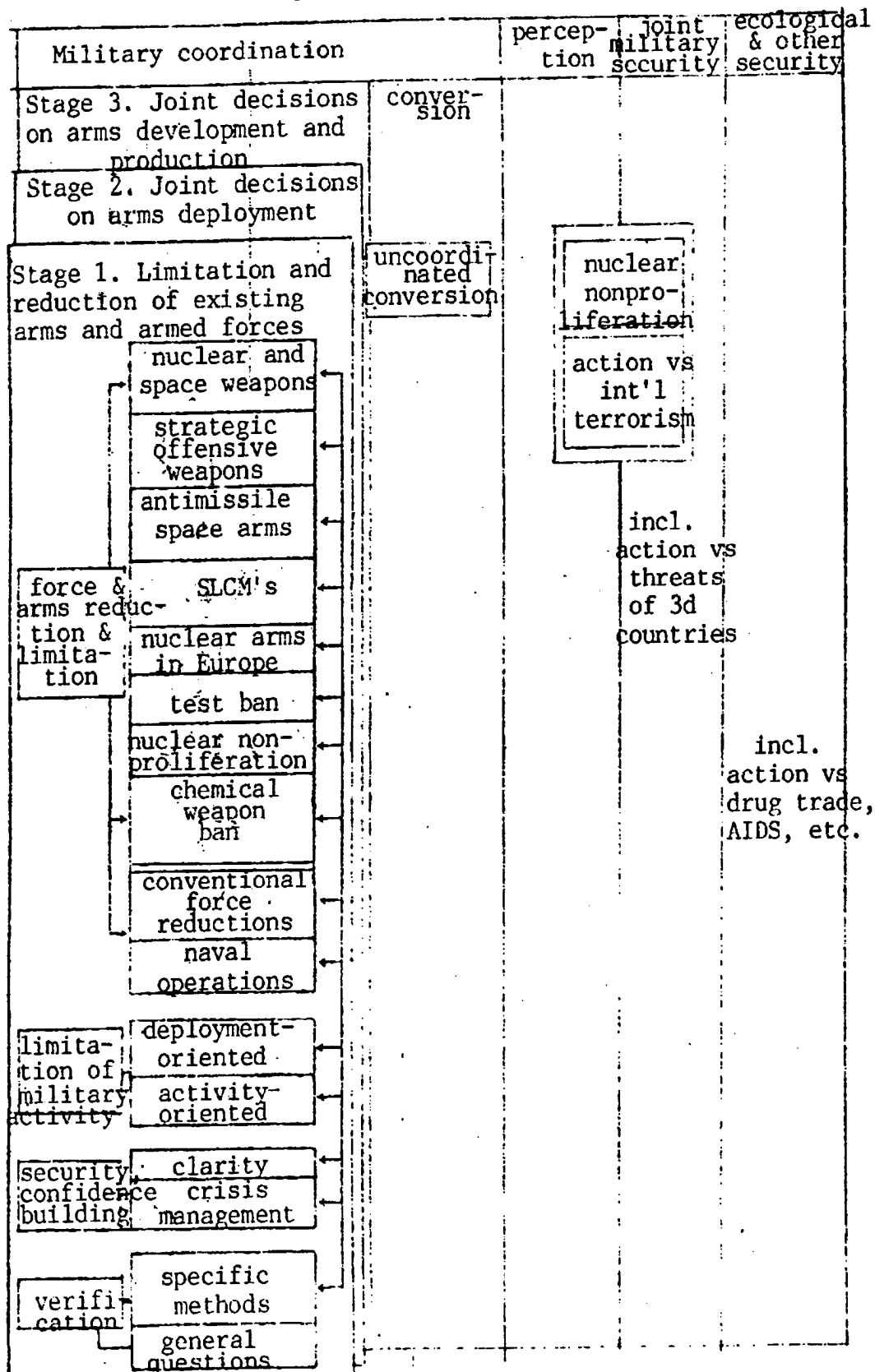
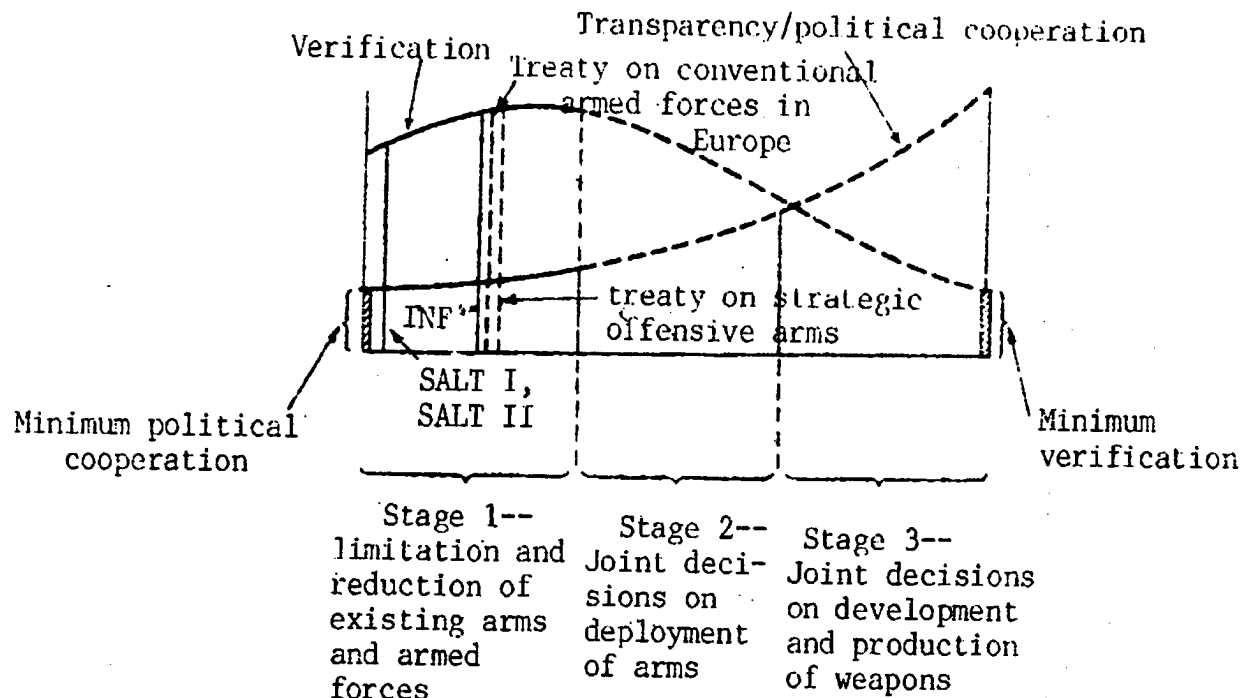


Diagram 2



#### Drawbacks of "Shortage of Transparency"

The development of events in this direction at this time is largely impeded by a shortage of trust. The absence of effective interaction for the objective assessment of each other's intentions and military programs is a strong destabilizing factor justifying the excessive expenditures of resources and promoting their growth. Any suspicions of the non-observance of treaties have the same effect.

Obviously, we can say that certain groups in the United States and in the USSR are interested in exaggerating the nature and scales of the existing military threat and opposing openness on the pretext of the need for continued secrecy. At this time, however, the changes in USSR- U.S. relations and in the world as a whole have made it difficult for these attitudes to win widespread public endorsement and to gain the upper hand. Clear material evidence of the damage suffered in the sphere of defense from departmental exclusivity in the USSR is provided, for example, by its perceptible superiority to other countries in the quantity of weapons systems, and in many cases in their numbers, which not only created a burden our economy could not bear, but will also require large additional expenditures for their destruction in accordance with strategic and conventional arms reduction treaties.

We must admit that we have strong traditions working against the move to transparency. Stalin's legacy of private, undemocratic decisionmaking, in the military sphere as well as others, was supplemented by the use of

bluffs to conceal our own weaknesses or to gain certain political advantages, which did work sometimes.

To this end, speculative observations were usually made about threats to national security, without ever formulating the objective criteria of security on the level of real needs and material military requirements, whether they concerned strategic or tactical nuclear weapons, purely defensive systems, or conventional arms. The confidentiality of USSR military programs still does not permit the precise determination of their purpose and cost, and this gives our partners an additional pretext for exaggerated estimates. The extension of budgetary glasnost to this sphere would strengthen stability and predictability.

When we discuss the prospects and main difficulties of progression toward the transparency framework, we must remember that although broad political statements have been made in the USSR about departures from the obsolete principles of the pre-perestroika period in foreign policy, their implementation is not keeping up with declared goals in many cases. The resistance of increased openness is still based on attempts to protect narrow departmental interests in the promotion of specific programs of military organizational development.

It might be useful to recall some of the more odious incidents responsible for the constant worries of the USSR's partners, worries which ultimately escalate—in line with the standard "action-reaction" pattern—an arms race that is inconvenient for us and does not serve our interests.

The thesis of "disarmament first, verification later" hurt the Soviet Union severely because the West took advantage of our excessive secrecy to substantiate the myths of the "Soviet threat." Sufficient evidence of this can be found in the rumors that were spread in the United States about the "bomber gap" and "missile gap," which led to the dramatic buildup of American strategic arms and then required us to make extremely costly efforts to catch up with the Americans. The "strategic defense gap" Reagan used to substantiate the SDI had a comparable impact.

For many decades the USSR tried to limit transparency, and this was clearly reflected in the approach to such Western proposals as the "open skies" initiative.<sup>2</sup> For a long time we also objected to on-site inspections, and one of the results was the loss of favorable opportunities for a total ban on nuclear tests in the late 1950s and early 1960s, which could have blocked many channels of the nuclear arms race effectively. We also wasted a great deal of time before we realized the need for confidence-building measures.

Now this kind of inconsistency is apparent in our approach to antisatellite weapons. The arguments in favor of keeping the Soviet antisatellite system cannot stand up to serious criticism, because the majority of experts agree that its effectiveness is extremely low, it does not have enough weapons for serious antisatellite operations, and its maintenance and probable improvement, however limited, will require additional funds. Now that the USSR's relations with the United States and NATO are so different from the relations of the early 1980s, resuming the tests of this system, not to mention putting the system on alert, would undermine our foreign policy position. The retention of the system, even in case of the deterioration of relations, would be all the more counterproductive now that the system is becoming hopelessly obsolete. Furthermore, the presence of the system and the atmosphere of secrecy surrounding it are conducive to various conjectures and stimulate corresponding R & D projects in the United States. References to Soviet antisatellite systems served as the pretext for the Pentagon's latest attempt to gain Congress' consent to finance the development of several new types of antisatellite weapons.

Broader openness in the military-space sphere would help in eliminating another important motive for the development of antisatellite weapons in the United States—the absence of definite rules of space activity in reference to military satellites. This applies above all to the so-called "ocean reconnaissance" satellites (the Western RORSAT category), the presence of which has been used as one pretext for the need to develop an American antisatellite system. Launching regulations—calling for, for example, a balanced presence of USSR and U.S. satellites of this type and others arousing mutual concern, approximately equal numbers in orbit at the same time, and advance notification of launches—could relieve some of the worries about the mounting "Soviet threat" in this sphere.

Inconsistency in the approach to antisatellite weapons, just as in many other areas of military organizational development, leads to a situation in which we could send the arms race in the most dangerous direction—into space—without gaining any military advantages whatsoever, while making a significant effort in the political sphere to prevent this.

Real prerequisites do exist, however, for the prevention of the development of antisatellite weapons. We should recall that in the late 1980s the U.S. Congress effectively blocked the development of an antisatellite airborne missile complex (based on the F-15 fighter). In fall 1990 Congress reduced the administration's request for kinetic-energy antisatellite weapon projects from 208 million dollars to 126 million, stressing that the allocation of funds for R & D in this field did not signify support for the deployment of antisatellite weapons. Congress also prohibited tests of a chemical laser against objects in space and allocated 2 million dollars for the development of the technology of long-distance verification of the power of ground-based lasers by national technical means.

The move from confrontation to increased cooperation in this sphere could create the prerequisites (along with other possible actions and initiatives) for the further limitation of the SDI program and the renunciation of its broad-scale nature. Possible stabilizing measures in this sphere could also include the extension of openness to the coordination of the nature and scales of R & D in the sphere of ballistic missile defense. Mutual tours of laboratories are only the first step, although an exceptionally important one, toward the initial stage of this activity. The resolution of the problem of antimissile space weapons as a whole within the context of agreed concepts or fundamentals of strategic stability could make a significant contribution to the establishment of the transparency framework.

In the sphere of **conventional arms** there is also a strong logical connection between political actions and declarations. In response to the USSR's announcement of the doctrinal and practical transition to the principles of reasonable sufficiency for defense, NATO representatives said for a long time that they would not take these intentions seriously until they were reflected in the reduction of the Soviet Union's "military capabilities." Until the USSR has eliminated the surplus weapons we inherited from the days of power politics, or the "poorly substantiated" military systems, it would be difficult to demand that the other side make moves meeting all of our expectations in the whole range of arms reduction and elimination.

There are still lapses, however, into secret large-scale moves in the sphere of defense in our country. In summer 1990, for example, the West was in an uproar over the massive transfer of Soviet weapons beyond the Urals from the zone of the scheduled reductions of conventional arms and armed forces. According to Western sources, the number of tanks was reduced from 41,600 to 24,800, the number of armored combat vehicles was reduced from 45,000 to 20,000, and the number of artillery systems was reduced from 50,000 to 18,000.

The scales of these gigantic transfers within just a few months were fully comparable to wartime transfers.

What might be the result of such actions when they are taken without making any advance announcements or even notifying the USSR Supreme Soviet? Will this make us seem more trustworthy to our partners in the common European home? What might be the reaction in China and other Asian countries to an abrupt rise in the number of Soviet conventional weapons beyond the Urals? What will it cost to build warehouses and depots to keep this quantity of military equipment from quickly becoming inoperable? Finally, how did the transfer of 60,000 pieces of weaponry exacerbate the crisis in transportation, jeopardizing the shipment of the biggest harvest in our history and causing chaos in the functioning of the national economy? What price are we paying for the absence of transparency?

One productive way of **optimizing Soviet military potential** would be the gradual and mutual institution of the transparency framework, leaving no possibility or objective prerequisites for the exaggeration of the military threat and promoting the accurate assessment of this potential. The mere display of mutuality and unequivocal willingness to cooperate would be the most effective way of countering speculation on the military threat. Of course, measures of this kind would also have significant political repercussions, creating the necessary conditions and reinforcing preconditions for the extension of transparency to other spheres of military activity. An important condition is the scrupulous performance and further development of the entire group of verification measures in connection with already negotiated agreements.

The Soviet Union's unilateral reductions and the democratic reforms in Eastern Europe persuaded NATO to begin revising the "flexible response" doctrine. It is clear that these changes, if they are actually made, should be followed by the reduction of NATO military-technical systems and a corresponding reduction of the threat to our country.

This, in turn, will give the USSR a chance to work on the further restructuring of conventional arms and the optimization of their numbers, and this means it will also have a chance to reduce direct expenditures. The elimination of mutual concerns in this area could result in the establishment of the necessary conditions for a qualitatively new stage of military-political cooperation, marked by stronger stability and security.

Increased glasnost would also make it possible for our Western partners, especially the U.S. Administration and Congress, to base their decisions on complete objective information (instead of on the "worse-case scenario"). This would effectively set a unique mechanism in motion outside the sphere of negotiations for the mutual correlation of decisions in this extremely important area, and we could avoid unsubstantiated excess funding.

**In the new political atmosphere, now that a qualitatively different level of dialogue on military issues has become possible, there is the prospect of the joint elaboration of the fundamentals of a general theory of the adequacy of military undertakings for the maintenance of national security.**

#### **Patterns of Transition to Transparency**

The main purpose of building the transparency framework is the guarantee of state security with a radical increase in the proportional amount of measures based on cooperation and the openness of military policy. A distinctive feature of this framework is the possibility of optimizing security systems. One of the important factors is the continued renunciation of ideological stereotypes. Although we can view the transition to transparency as an objectively predictable development of the near future, we must also consider the features that might concern the representatives of departments responsible for making security-related decisions.

In our traditional thinking, it still seems strange to institute openness in areas which were just recently part of the sphere of carefully guarded state secrets. The disappearance of these stereotypes was most clearly reflected recently in the conclusion of the INF Treaty in 1987, which put an exceptionally broad range of objects under control, including the producers of the nuclear weapons to be eliminated and of weapons not limited by the treaty. To date, however, there have been no serious complaints about inspections of these sensitive installations (especially the plants in Votkinsk and Magna). This is largely due to adequate advance planning, mutual restraint, and the strict regulation of verification measures, which are limited by the goals of the specific treaty.

This example clearly corroborates **the need to synchronize processes during the move to greater transparency** in the political sphere (including their materialization in the form of international legal documents) and the military sphere. For the foreseeable future this will mean that **the level of transparency should correspond to, and probably will be indissolubly connected with, the scales of changes in military-political intergovernmental relations**—stronger trust between countries, the disappearance of the "enemy image," etc. Evaluations of many of these components seem extremely subjective, but there is no question that the move to transparency will be impossible if suspicion and the expectation of the worst case should continue or grow stronger.

By the same token, the principal danger during the stage of transition to the initial level of transparency will be the disalignment of these processes, when, for example, openness in the military sphere moves ahead while the atmosphere suddenly cools down again in the political sphere and the "age of mistrust" returns. This can be prevented by **creating the necessary safety mechanisms to**



interrupt the fulfillment of specific transparency measures in the most sensitive areas (primarily the sphere of national security) if necessary (particularly during the transition period).

In confirmation of this thesis, we should note that, first of all, under the conditions of transparency all states (including so-called potential adversaries) will carry out all measures dictated by the new level of openness in equal amounts and to an equal extent.

Second, we must remember that the transition to the transparency framework must be made gradually or sequentially, at specific times, and that the entire process will be impossible unless parallel and diverse joint measures are taken in the military-political sphere, including the further reduction and elimination of arms. This kind of transition will serve the goals and interests of stronger stability most completely.

To prevent undesirable disparities in the mutual security framework during the transition period (the weakening of one side's security, for example), a whole group of preventive measures could be taken, including the following:

Each stage will be governed by a group of international legal commitments, specifying the objectives and time-frame of the given stage of the transition to transparency, with a broad range of adequate verification measures and possible liability for violations of agreements;

The fulfillment of agreements in each stage will be monitored by a new or existing international oversight mechanism in order to preclude protests in this sphere. The ability of each participant to withdraw from the system of agreements in the event of a threat to its security, which will be discussed later, will serve as an important safety mechanism against the materialization of this threat. Furthermore, the level of openness reached by that time in conventional arms, for example, should completely exclude the possibility of the potential for a surprise attack or a large-scale offensive. During the next stage of dialogue, we can expect a move to jointly and unequivocally specified stable structures of the nuclear balance;

An important condition of successful progression toward transparency will be the gradual extension of the framework to an ever larger group of states, especially those possessing nuclear weapons and those preparing to join the "nuclear club."

A legal principle included in contracts specifies the right of parties to withdraw from the agreement in the event of extraordinary circumstances posing a threat to their "higher interests." There is no question that until the move to the transparency framework has acquired irreversible features through the development of all spheres of intergovernmental relations, and especially by means of political and international-legal guarantees, each state should reserve this unilateral right. A new element of the principle, however, should be possibility of international

oversight of the reasons for the exercise of this right. This purpose could be served by international mechanisms, with some development and supplementation of existing structures, such as the forum of states party to the all-European process for Europe and the United Nations for countries outside Europe. Rulings on the validity of the state's reasons for withdrawing from specific undertakings within the transparency framework **could be binding and could envisage specific sanctions** for invalid responses and non-compliance with forum rulings.

Measures of this kind could serve as the basis for a system guaranteeing the truly equal security of all parties to it.

### Some Conclusions

In summation, we can list several of the conditions of the functioning of the transparency framework in the first stage, the present phase of armed forces and arms limitation and reduction, without which further progression would be impossible or extremely difficult. These conditions actually represent a unique group of measures planned and carried out on the unilateral, bilateral, and multilateral levels.

The present phase is distinguished by the special importance attached to some **far-reaching unilateral steps the Soviet Union should take** in order to demonstrate its willingness to reach the level of transparency already achieved by most of the members of the international community. Above all, this applies to the need for the unconditional correspondence of actual moves in the military-technical sphere to our policy statements.

Second, glasnost in military matters should be affirmed by employing the news media to provide the Soviet and foreign public with the kind of military-economic reports that have become the norm in the world.

Third, there must be a transition to the open and thorough discussion of all military issues in the country's highest legislative body, and this body must be able to oversee the decisionmaking process in the military sphere, including decisions on arms development programs.

Finally, the use of the mechanism outside the official negotiation process should occupy a prominent place in this context because it will allow for the coordination of the scales and development levels of military programs to some extent.

The points of departure already exist for some of the areas of transparency illustrated in Diagram 1. Experience has been accumulated, for example, in joint actions in the ecological sphere, the struggle against terrorists and the drug mafia, etc.

In the broader context, the gradual and consistent institution of transparency will necessitate a working structure of bilateral (or multilateral) interaction for the exercise and expansion of cooperation on a permanent

basis. One example of this type of structure is the standing consultative commission (although there have been many complaints about its work) formed to investigate questions about the observance of the ABM Treaty and to "voluntarily supply the information each side requires for the ascertainment of the fulfillment of commitments."<sup>3</sup> For the improvement of activity of this kind in the future, the basic parameters of mutual openness should include the stipulation of the obligatory (and not voluntary) provision of information on matters of concern to the parties.

Unconditional multilateral measures would include the strict observance of existing and pending agreements, which would help to build confidence, and a steadily rising level of military openness, reflected in the absolute fulfillment of information exchange commitments, willingness to submit to inspections and other forms of verification, and the agreement to resolve all disputes on a cooperative basis. The regular and permanent nature of the standard procedure for alleviating mutual concerns on this basis would be the first step toward the creation of permanent structures of joint decisionmaking (the second stage of military coordination), the prototype of which can be seen in the Soviet proposals on a European security center.

Transparency will make it possible to surmount many complex military-technical problems connected with the early warning of missile strikes. A combination of geographic and technological factors and the consequences of the mistaken decision at the Krasnoyarsk radar station will complicate matters considerably for the USSR in this sphere. The move to cooperation in the sphere of ballistic missile early warning systems (BMEWS), one element of which is the Krasnoyarsk station, will make joint action possible, and this will be much less expensive for us (as compared to the cost of building two new stations to replace the one to be dismantled). The plans for possible undertakings in this area, such as the creation of the so-called BMEWS zero level (the "black boxes" in the ICBM silos) already exist. All of this indicates the presence of a distinct dialectical connection between transparency, the doctrinal portion of strategy, and the structural reorganization these measures will introduce into the military-technical portion of doctrines.

The extension of transparency to previously confidential areas in the form of, for example, an agreed level of openness in the discussion and assessment of the existing military threat and in the development, testing, and deployment of weapons in line with military programs, could equalize conditions somewhat in military-technical competition, enhance its efficiency, and insure the sides to some degree against technological breakthroughs or failures. If this should eliminate mutual concerns permanently, there will be no reason for the appearance and development of military programs with no military justification, including programs for the qualitative improvement of weapons.

There can be no doubt that measures to expand the transparency framework will cost millions of rubles and dollars but will produce a direct savings of billions. The sides will be spared the need for excessive military organizational development. There is already an indirect but quite distinct correlation (the same mechanism outside the official negotiation process), operating in the sphere of military allocations, between the shows of restraint in the organizational development of the Soviet Armed Forces (including the force reductions) and the decisions to reduce the U.S. military budget.

The prospect of a joint decisionmaking process in the future, particularly in the budgetary sphere, will provide unprecedented sweeping opportunities to optimize military spending, free funds from the military sector of the economy, use military conversion effectively, put an end to the unjustified and irresponsible expenditures of government funds, and establish glasnost. In addition, there will be the savings in expenditures on costly forms of verification (especially in space), permanent on-site inspections, and others.

The move to increased transparency will also produce a savings for the United States and the European states, and this is why the idea of carrying out this process in a specific sequence, with the joint planning of phases and intermediate goals, will evoke a positive response from the international public. The point of departure could be a thorough discussion, perhaps on the level of scientific experts at first, of the basic goals and phases of the move to transparency with our partners in Europe as well as the United States and Canada.

#### Footnotes

1. PRAVDA, 27 November 1989.
2. V.M. Zubok, "Open Skies Over the 'Superpowers,'" SSHA: EKONOMIKA, POLITIKA, IDEOLOGIYA, 1990, No 7—Ed.
3. "Borba SSSR protiv yadernoy opasnosti, gonki vooruzheniy, za razoruzheniye" [The USSR's Struggle Against the Nuclear Threat and the Arms Race and For Disarmament], Moscow, Politizdat, 1987, p 360.

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#### George Antonovich Gamow

914K0016B Moscow SSHA: EKONOMIKA, POLITIKA, IDEOLOGIYA in Russian No 1, Jan 91 (signed to press 28 Sep 90) pp 55-63

[Article by Igor Eruandovich Lalayants, candidate of biological sciences and scientific associate at Neurosurgery Institute of USSR Academy of Medical Sciences imeni N.N. Burdenko]

[Text] This name signifies another loss Soviet science suffered as a result of the difficult circumstances of the 1930s that had such a severe effect on our history. These circumstances forced real scientists to emigrate and seek

opportunities for creative work in the United States. The very fact that many of our researchers found an environment abroad conducive to the free expression of their opinions and the disclosure of their talents attests to the value of the social and political conditions needed for the thorough disclosure of the genetic combinations that are given different names in different countries—talent, charisma, or a gift “from God”—but are essentially the same. In this case, the rule is corroborated by another regrettable example from our history. This example is the life and work of the remarkable theoretical physicist G.A. Gamow.

Anton Mikhaylovich Gamov, the father of the future world-renowned scientist, was a teacher of Russian language and literature at the Odessa Technical Academy. His son, named after St. George the Dragonslayer, was born on 4 March 1904 (new calendar). He graduated from the academy where his father was a teacher in 1920, when the administration in Odessa was changing more frequently than the seasons of the year. After spending some time in the Odessa University School of Physics and Mathematics, Gamow moved to Petrograd. He was attracted to the northern capital because the physics courses at the university there were taught by the most prominent professors. He began by taking some courses in experimental optics, but he quickly realized that this was not his calling. This decision was also influenced by the difficulty of doing anything constructive in the ravaged and cold laboratory.

In 1925 Gamow became interested in A.A. Fridman's work with simulations of the expanding universe. Fridman was corresponding with Einstein himself and had even been able to convince Einstein of the accuracy of his own theory after a fairly dramatic intellectual struggle. This is when young physicist Gamow became acquainted with relativist cosmology and the theory of relativity, the acknowledgement of which led to the conferral of the Nobel Prize in Physics on Einstein in 1921.

Gamow's second lifelong love was quantum physics. He made his first contribution to it in 1926, when he published his first article in this field. The work attracted the attention of the famous Professor O.D. Khvolson, who gave Gamow a recommendation to Goettingen.

The ease with which people traveled around Europe then can only amaze us today. On his own initiative, Gamow “dropped in” on N. Bohr, the Nobel laureate who had won his prize a year after Einstein, in Copenhagen on his way home from Germany for a scientific debate. The young Russian had already achieved impressive results in his work on the theory of the decay of the alpha particles making up the nuclei of helium atoms. He was also interested in wave mechanics, which had been made famous by Austrian physicist E. Schroedinger, a native of Chernovitsy (who was to be awarded the Nobel Prize in Physics in 1933). Gamow tried to prove that the wave function was the fifth dimension, with the four others representing Einstein's space-time continuum.

Bohr, who could sense talent and who had gathered talented researchers from all over Europe at his institute in Copenhagen, offered Gamow a chance to work with him for a year. Here Gamow was able to resolve a paradox which had recently come to light and was based on E. Rutherford's discovery. The Englishman maintained that the uranium nucleus successfully “resisted” penetration by outside alpha particles. It could, however, emit these same alpha particles, and this was the reason for its natural radioactivity. Gamow resolved the paradox by proving that the alpha particles of the uranium nuclei “tunnel under” the energy barrier in the nucleus of this element. This was an extremely important discovery of great practical value. Bohr was delighted with the talented Russian theorist's achievements. The work progressed, and Gamow, along with renowned scientist F. Houtermans and his assistant R. Atkinson, made the first contribution to the development of the theory of stellar thermonuclear reaction, which was later developed further by German physicist H. Bethe, who moved to the United States after Hitler rose to power (Bethe was awarded the Nobel Prize in Physics in 1967).

Soon after his triumphant return to his homeland, Gamow received a grant from the Rockefeller Foundation and went to the Cavendish Laboratory Rutherford headed in Cambridge in fall 1929. There he discovered the nuclear resonance of alpha particles, and Rutherford asked him to judge the level of energy required to split atomic nuclei with the aid of artificially accelerated protons (nuclei of the hydrogen atom). His calculations proved that the problem was solvable and the idea was feasible. Encouraged by all of this, Rutherford turned the project over to his student J. Cockcroft, who built a particle accelerator a short time later (Nobel Prize in Physics in 1951).

In Cambridge Gamow met another one of our physicists, P.L. Kapitsa, and formed a close relationship with him. After Gamow left England, he went back to Bohr's laboratory, where he wrote a long article on the structure of the atomic nucleus. In Copenhagen, he received an invitation from Nobel Prizewinner G. Marconi, who was fascinated by nuclear physics in his last years. Under his patronage, the first international congress of physicists was held in Rome in October 1931. The first artificial splitting of the uranium nucleus would take place in just a little over 10 years.

At this point, however, Gamow's plans were jeopardized. He had almost no money and therefore decided to “take a ride” to Marconi's on...a motorcycle. We must not forget that the “maestro” was only 27 years old. To make this trip, however, he had to renew his passport in the Soviet consulate. When our ambassador sent the request to Moscow, he was told to send Gamow home immediately. In his book, “My World Line,” which was published in New York in 1970, Gamow quotes the ambassador: “I advise you to go home, show your face in Moscow, and then take a vacation by the Black Sea while a new passport is drawn up for you.”<sup>1</sup>

As soon as he returned to Moscow, Gamow sensed how much the atmosphere had changed. His university colleagues and friends stared at him with amazement and asked why the hell he had come back. When he asked what had happened, he was told that the attitude toward science and scientists had changed dramatically.

Of course, it had been a long time since August 1922, when all of the philosophers were driven out of the country and Trotsky wrote: "The elements we are deporting are politically worthless, but they are a potential weapon in the hands of our possible enemies. In the event of new military complications, all of these elements could be political agents of the enemy. This is why we chose to deport them before this could happen."<sup>2</sup>

It appeared that A.A. Bogdanov's prophecy had come true: "Even in the places where socialism takes hold and emerges triumphant, its nature will be severely distorted for a long time by the many years of the state of siege and necessary terror and militarism, with a barbarous form of patriotism as the unavoidable result."<sup>3</sup> Bogdanov wrote these words, which Lenin disputed in his book "Materialism and Empirical Criticism," in 1908.

The prevailing atmosphere of those years in the Academy of Sciences can be judged from the debate begun by A.M. Deborin, N.I. Bukharin's right-hand man. The pearls of this discussion include the following words: "Academician Vernadskiy does not draw any distinctions between materialistic and idealistic philosophy; ...we have been presented with a 'new' religious philosophy cloaked in a dense mystical fog.... Vernadskiy's whole view of the world is naturally deeply alien to materialism and our contemporary way of life and our socialist construction."<sup>4</sup>

Things were no better in other fields of science. The most famous Russian geneticist, Yu.A. Filipchenko, who had opened the first eugenics bureau in Petrograd in 1921, died in disgrace in 1929. When his student F.G. Dobrzhanskiy learned of his teacher's death, he decided to stay in the laboratory of T.G. Morgan, who later became famous in the United States as an outstanding evolutionary geneticist.<sup>5</sup>

On 11 December 1930 Gorkiy published his response to A. Einstein and T. Mann in an IZVESTIYA article entitled "To the Humanists," in which he wrote: "Is the violent restraint of the human being practiced for the sake of his own development? I say yes! Culture is the intellectually organized restraint of man's zoological instincts."<sup>6</sup>

More zeal was displayed in a review in POD ZNAMENEM MARKSIZMA by the son of renowned botanist A.K. Timiryazev, who praised a book by German physicist P. Lenard, the winner of the Nobel Prize in Physics in 1905 who actively opposed the conferral of the prize on Einstein and was later famous for his vigorous activity in the service of fascism. "The Principle of Relativity, Ether, and Gravity," the German

book criticizing Einstein's theory of relativity, won a positive response from the journal.

It was echoed by BOLSHEVIK: "As a philosophical principle, the principle of relativity leads to the denial of the objectivity of movement. The theory of relativity, with its Machistic philosophical arguments, has served and still serves as the basis for subjective idealistic conclusions about space, time, and matter."

Schroedinger was also attacked: A lapse into "Schroedinger's predilection for indeterminism is a 'primary' accident that cannot be foreseen.... No theory (bourgeois, which has lost its case forever) can offer anything at all to counter the iron-clad determinism of Marxism-Leninism. There is no other science!"<sup>7</sup>

We cannot say that intelligent scientists did not object to this. At the Eighth All-Union Conference on Physical Chemistry in the National Economic Council in the middle of December 1931, Professor Ya.I. Frenkel said: "The dialectical method has no right to claim the leading role in science. Our policy is displaying an extremely harmful tendency to force the ideas of dialectical materialism on scientists and youth. Socialism demands validation, and it is provided by historical materialism, but this is not related to dialectical materialism, which inhibits the development of science. Neither Lenin nor Engels is an authority to physicists. Lenin's book is simply a collection of elementary facts which are not worth fighting over. Our philosophy is reactionary, and I hope that the party will realize this soon. Comrade Bukharin's remarks have already provided an example of this. There is no such thing as proletarian mathematics, proletarian physics, and so forth."<sup>8</sup>

Gamow immediately joined the fight, which was natural for a person who had recently been engaged in free and independent debate with the most prominent authorities in physics. Besides this, the prevailing atmosphere had been completely different when he left the country. The government was interested in restoring contacts abroad and took pride in the fact that its scientists were invited to foreign laboratories and universities and to work on scientific projects in Western Europe and America. This is how botanist N.I. Vavilov, physicist P.L. Kapitsa, and geneticist N.V. Timofeyev-Resovskiy ended up abroad. The names of chess player A. Alekhin and poets V. Mayakovskiy and S. Yesenin could also be added to the list.

Now, however, science, as Gamow wrote in his book, had been turned into a weapon against the bourgeoisie. Hitler divided science and art into Aryan and Jewish (Lenard immediately categorized himself as the former) when he took charge, but Stalin divided them into proletarian and bourgeois. Communication with scientists abroad became a criminal offense. Industrial espionage began to be employed more vigorously: Those who did go abroad were expected to learn as many capitalists secrets as possible without divulging any proletarian ones.

The Marxist ideology, to which scientists were supposed to adhere in their intellectual endeavors, acquired great significance. Furthermore, science was supposed to be governed by the philosophy of dialectical materialism, which the founders of Marxism had developed in works on social issues. Any deviation from the "true" ideology was punished mercilessly because it threatened the cause of the working class.

Gamow's ideas about the situation in the country, as we have seen, were common among physicists. A relatively recent publication indicates that even our outstanding physiologist I.P. Pavlov made equally pointed observations in his letters to Molotov.<sup>9</sup>

Gamow could see that the philosophers were simply ignorant of his science and did not understand the fundamentals. He felt this was completely understandable, because purely scientific matters are difficult for the layman to understand. Besides this, they did not enter into the group of concepts traditionally discussed by philosophers and familiar to them: ethics, aesthetics, and gnosiology. But whereas philosophers in the West were "harmless," as Gamow put it, in a country with a totalitarian regime, which had been established in our country at the beginning of the 1930s, official philosophy could inflict irreparable damage on science. The staff philosophers in technical scientific institutes knew little about the matters discussed by specialists, but their reports were often more influential than the director's opinions.

Gamow felt that one example of this control and dictatorship was the prohibition of Einstein's theory, and on the grounds that it denied the existence of the ether medium on a purely scientific basis. Gamow remarked that the existence of ether had been questioned long before Einstein by Engels, who wrote the following in a letter to a friend: "...the ether medium, if it exists...."

Gamow tried to fight against this dictatorship with humor. Once, he relates, he and L.D. Landau read the "Ether" entry in a newly published volume of the Soviet Encyclopedia which said that the ideas "of Einstein are unacceptable from the standpoint of dialectical materialism. The ether medium must exist and must have the properties of matter. It is the job of Soviet scientists to prove its existence and define its mechanical properties. The ideological principles on which Einstein's theory is based contradict the basic principles of Marxism, and this is why it must be rejected...."

The young scientists were amused by the stupidity of the entry and decided to send the author—a fairly prominent philosopher who later died in Stalin's camps—a humorous letter, saying something like the following: "Inspired by your article on ether, we are eager to prove its existence. Old man Albert with his fervor is an absolute idiot. We beg you to lead the search for phlogiston, thermogen, and liquid electricity. G. Gamow, L. Landau, M. Bronshteyn<sup>10</sup> et al."

There was an immediate reaction to this. All of them were given a spanking, driven out of institutes and universities, and accused of attacking dialectical materialism and Marxist ideology. At a meeting, they were charged—on orders from Moscow—with "sabotage." The minimum penalty for this alone was exile. Two of the students who signed the letter were kicked out of the university and sent to Leningrad, to teach them not to try anything of that kind again.

Only in distant America, where he could feel safe, was Gamow able to make jokes about what had happened. He viewed the philosophers' interference in physicists' affairs as an annoying hindrance, but it turned into a genuine disaster for biologists. In 1951, when Gamow was working on the hydrogen bomb in Los Alamos, he received an invitation from biologists in the medical center in Denver, Colorado, to give them a physicist's view of biology. The echoes of the notorious VASKhNIL session and "Pavlov case" in the USSR had just died down. In his speech, Gamow addressed the "differences of opinion in genetics." Gamow began talking to the unsuspecting scientists about G. Mendel's old theory of heredity, to which geneticists in Europe and the United States still subscribed without question.

At that time a famous Soviet agrobiologist had come up with some new and revolutionary ideas denying the possibility of chromosomal mutation. According to his theory, all changes in living organisms were caused by the environment and only the environment, after which they could be inherited.

His listeners were stupefied and ready to explode with anger. They looked at the visiting physicist with pity and disgust. Gamow had the feeling that they would start throwing rotten eggs at him soon, but he continued imperturbably: "Sometimes Mrs. Doe gives birth to a child who does resemble, in line with Mendel's ideas, her husband John. On the other hand, the baby quite often bears a strong resemblance to Sam Peters, the milkman, and this corroborates the theory about the influence of the environment."<sup>11</sup>

The thunderous applause of the scientists, who were roaring with laughter, kept Gamow from finishing his carefully rehearsed speech....

Gamow married Lyubov Vokhmintseva, a graduate of Moscow University. The reason they married, as Gamow wrote, was...Imistry. Two of the lines on his palm did not meet, and there was only way to find out whether this was hereditary. On 4 November 1935, when he was already in Georgetown in America, he looked at the palm of his newborn son and saw that the lines there did not meet either. The trait was dominant.

But he still had to get to America. How was this to be done when the country's borders were "locked"? When he was still in Copenhagen he had received an invitation to teach a class at the University of Michigan, but neither the invitation nor a letter from Marconi helped him get the passport he wanted. He and his young wife studied

the map carefully. Sestroretsk, the closest crossing to Leningrad, was out of the question because of the many border guards. They considered the possibility of crossing the border into China and then tried to figure out ways of leaving the country through the Crimea.

The couple used a clever excuse to acquire a canoe, in which they planned to sail to Sweden. Getting an adequate supply of food was a big problem in Leningrad. Nevertheless, they were able to get a few chocolate bars and a couple of bottles of brandy and to boil some eggs. They even paddled out to sea. Gamow hoped to call Bohr in Copenhagen from Stockholm to ask for help, but a sudden storm kept them from carrying out their plan. They had to go back home.

Later they thought of crossing the border in Khibiny. They traveled to the Kola peninsula with Landau, who had no plans to leave because "he was always a zealous Marxist, although he had Trotskyist leanings." Landau wore a red jacket and said that no matter how bad things were in Russia, they were even worse in the capitalist countries (this did not help him, and only a miracle, as well as letters to Stalin from Kapitsa and Bohr, saved him from Yezhov's hell).

The situation was getting more tense. It would not be long before scientists would be arrested, even foreign scientists working in our country. Houtermans, with whom Gamow had worked, was arrested. Nobel Prize winners J. Perrin and the Joliot-Curie couple wrote to Stalin about Houtermans and A. Weisberg, who had been arrested with him:

"There is the danger that their confinement will provide new grounds for the political campaign that recently inflicted so much damage on the prestige of the nation of socialism and the USSR's joint work with the great democracies of the West. The situation is complicated by the fact that the Western scientists who are known to be friends of the Soviet Union, and who defended the Soviet Union against the attacks of its enemies, still know nothing about the fate of Houtermans and Weisberg. This gives us no chance to explain the circumstances to the public in our countries."<sup>12</sup>

Suddenly the People's Commissariat of Education informed Gamow that he would be sent to the next Solvay Congress in Brussels on nuclear physics. The congress was scheduled for October 1933. Gamow was officially summoned to Moscow to pick up a passport, tickets, and money—-in general, everything he needed to go abroad.

It seemed like a dream come true, but Gamow did not want to leave his homeland forever. If he could only have had the chance to travel around the world freely and keep up contacts with his colleagues, he would certainly have returned, but he despised the theory of the hostility between "capitalist" and "proletarian" science. Besides this, he did not like the idea that he might be sent to Siberia for his views someday, which was a strong possibility in the atmosphere of mounting repression. As

a professional, he was able to judge the probability of events. As a human being, he had a fairly well-developed sense of danger and self-preservation.

He asked Bukharin, who had always treated him well, to arrange an appointment for him with Molotov, who could allow his wife to accompany him abroad. Molotov was the chairman of the Council of People's Commissars, and virtually everything in this area depended on his decisions. Molotov received Gamow, seated behind Lenin's desk, and they discussed the report the scientist would present in Brussels, after which Gamow requested permission to take his wife along.

Molotov replied that he should be able to get along without his wife for 2 weeks. Gamow decided to go for broke and said that she had never been abroad, where there were so many wonderful stores, and that he wanted to show her Paris, so she could see the Louvre and the Folies-Bergere and also do some shopping. Molotov promised to help make all the arrangements for this.

Just a few days before he was to leave in October, however, he learned that there was no passport for his wife and that she probably would not get one. Then Gamow refused to go! The official insisted that the scientist had to go because he was a "representative of the Soviet Union" and so forth. Gamow said they could take him to Brest under escort, but the guards would not be allowed to cross the border, and he would not go on to Brussels without his wife. Then no one in the Belgian capital could take him to the conference hall. With these words, he left the office, with no hope of success.

Four days later, however, a voice on the telephone told him to come and pick up two passports. The road to freedom was clear. The couple set off for Brussels via Copenhagen.<sup>13</sup>

The year of 1933 was extraordinary in some respects for Stalin. The hunger in the Ukraine, a result of his orders, was being discussed openly and loudly in Europe. As we now know, newspapers and magazines in the Western countries, especially France and Germany, were full of these reports. In Stockholm they decided to award the Nobel Prize in Literature to Ivan Bunin, who received it under the flag of the League of Nations. Stalin's position was also somewhat shaky within the country, and even in the party, and the 17th "congress of victors" was to be held soon.

It is quite possible that the combination of all this—the insistence on sending Gamow to the congress as a delegate and the fact that the congress coincided with the announcement of Bunin's award—caused what Gamow referred to as the "short-circuit" in the upper echelons of the Kremlin that allowed the scientist to leave the country with his wife....

After Brussels, Gamow wrote to the University of Michigan to learn whether they might renew their kind invitation. To his amazement, the university agreed. Finding a way to stay in Europe for the winter was his

only remaining problem. Bohr categorically refused to help, and he told Gamow that he had solicited the help of Paul Langevin, who was then the chairman of the Soviet-French Committee on Scientific Cooperation. Langevin had requested Moscow directly to appoint Gamow the delegate to the Solvay Congress.

Gamow wrote about this in his book.

"'You should go home, Gamow,' Bohr told me. 'Langevin arranged for your trip at my request, and I am fully responsible.'

"I felt terrible. On the other hand, I had been able to get a passport for my wife without any outside help.

"That same day we received a dinner invitation from Marie Sklodowska-Curie. I was seated next to her and told her about our difficulties.

"All right. I will talk to Langevin tomorrow,' she promised.

"The next day Marie came to the library of the Pierre Curie Institute.

"'Gamow,' she said, putting her hand on my shoulder, 'I spoke with Langevin. You can stay.'

"There were rumors at the time that my decision not to return to the USSR was one of the reasons that Kapitsa, who was in Moscow that summer, was not allowed to go to England. They were false rumors.

"The Kapitsa incident has much deeper roots. When he was not allowed to return to Cambridge in October 1934, I had been teaching summer school at the University of Michigan and had just arrived in Washington, where I was offered a position as a guest professor. I registered with the consulate as a Soviet citizen and submitted my passport for an extension until the next summer. That winter we stayed in contact with consulate personnel and even went to the movies with them, criticizing the Hollywood productions. The Kapitsa incident reinforced my decision not to go back to Leningrad."

We recently learned of Gamow's "involvement" in the detainment of Kapitsa from a letter by P. Dirac, in which he lists the "three reasons for the detention. A) An unsubstantiated report from England about military work.... B) Gamow: He asked Molotov to grant him the same status Kapitsa had before October 1934 and made this a condition of his return to Russia. C) Abilities of apparent value in a time of war.

"He (Kapitsa) was outraged by these motives and asked to resign. For this reason, it was much easier to begin research in a new field...."<sup>14</sup>

Therefore, we can see that Petr Leonidovich himself was outraged by the "motives," and not by Gamow. We can assume that he also understood a great deal "after October 1934," and that he also felt that the rumors that were being spread about Gamow's failure to return in

connection with his own detention were "false." They had been on extremely good terms since Cambridge in the late 1920s. A photograph from that time still exists, where we see them in the back yard of the Cavendish Laboratory during a "cigarette break." Gamow is wearing breeches and spats, a vest and a jacket with a white shirt. He is wearing glasses with round frames and his hair is neatly parted on the side. Kapitsa, holding his favorite English pipe in his hand, wears a black academic gown over his suit and a university cap with a square brim and a tassel....

After spending 2 months at Marie Curie's, the Gamows moved in with Rutherford at the Cavendish Laboratory in winter and then left for the United States in summer 1934. Gamow taught at George Washington University until 1956, when he moved to the University of Colorado. The tall red-headed Russian with the blue eyes and legendary sense of humor, who spoke six languages with a distinctive accent he called "Gamovian," got along well with Americans. A book he co-authored with E. Teller, "Sources of Nuclear Energy and Stellar Evolution," was published in 1938. His book "The Expanding Universe" came out the next year, and "The Neutrino Theory of Stellar Collapse (or Compression)" was published in 1941.

Gamow discovered E. Teller in Washington. By summer 1936 they had already formulated the "Gamow-Teller principle" that is famous among nuclear physicists. This is commonly viewed as Gamow's last major contribution to pure nuclear physics. After this he was preoccupied with the application of its theories to astronomy and cosmology. He organized the first conference on thermonuclear physics at the beginning of 1938.

The next year Gamow and Teller discovered a big nebula through a telescope and watched as it gradually divided into two, which served as proof of the rotation, or revolution, of the universe. An article on this was published in NATURE magazine after the war in 1946. In 1940 Gamow began studying the neutrino, which was new to physicists at that time, and was looking for emissions in supernovae.

The idea that the universe revolved around a distant center gave him reason to wonder about the big bang as the beginning of everything, the origin of chemical elements, and the "residual" or remaining radiation that might still be recorded today (this radiation is the proof of the big bang resulting in the birth of our universe). On 1 April 1948 Gamow and his student R. Alpher published a letter in PHYSICAL REVIEW which was later known as "Alpha-Beta-Gamma" (H. Bethe was named as the third author to preserve the order of the Greek alphabet—another one of Gamow's jokes). The article discussed the residual radiation in the depths of the universe, which was subsequently discovered in 1965. The Nobel Prize in Physics was awarded to A. Penzias and R. Wilson for this in 1978.



The discovery of the double-chain structure of the DNA spiral, the substance of our genes, by F. Crick and J. Watson in 1957 aroused Gamow's interest in biological codes. This was the beginning of his fascination with genetics. The next year he published an article on the possible connection between the structure of DNA and the structure of proteins, and a year later his analysis of the statistical connection between protein and nucleic acid was included in the published works of the National Academy of Sciences. In these articles he formulated the basic premises of an understanding of the genetic code lying at the basis of all life on earth.

During World War II Gamow served as a consultant to the U.S. Navy on explosives. After the war he went to the Bikini atomic test site, and in 1948, after he was "cleared" by the secret service, he began working with Teller and the Polish S. Ulam on the hydrogen bomb in Los Alamos.<sup>15</sup>

Gamow was elected a member of the American Physical Society, the National Academy of Sciences, Denmark's Royal Academy of Sciences, and other associations. He was the author of 140 scientific works. Ulam said he may have been the last example of dilettantism in science, dilettantism in work of the broadest scales.

Gamow also became famous as the author of popular-science literature. In 1937 he explained the fundamentals of the theory of relativity in an article in *HARPER'S MAGAZINE*. The article attracted the attention of C. Snow, the editor of *DISCOVERY* magazine, who realized that Gamow could be a wonderful popularizer. He asked the scientist to rewrite the article in book form, thereby launching his new "career." Gamow wrote almost 30 popular-science books. In 1956 he was awarded the Kalinga Prize, a prestigious prize in the world of popular science. At UNESCO's request, he made a lecture tour of India and Japan.

G.A. Gamow died on 20 August 1968 in Boulder, Colorado, and was buried there. He is another one of our countrymen who found a new home in the United States, where all of his remarkable talents were revealed in their entirety.

#### Footnotes

1. KHIMIYA I ZHIZN, 1989, No 5, pp 24-34.
2. OGONEK, 1990, No 24, pp 14-16.
3. ZNANIYE—SILA, 1990, No 2, pp 66-72.
4. VESTNIK AN SSSR, 1990, No 3, pp 86-97.
5. KHIMIYA I ZHIZN, 1990, No 2, p 93.
6. YUNOST, 1989, No 11, pp 59-61.
7. ZNANIYE—SILA, 1990, No 2, pp 75-80.
8. Ibid.
9. SOVETSKAYA KULTURA, 14 January 1989.

10. M.P. Bronshteyn died in Stalin's camps. Quoted in KHIMIYA I ZHIZN, 1990, No 2, pp 24-34.

11. Ibid.

12. ZNAMYA, 1989, No 3, p 166.

13. KHIMIYA I ZHIZN, 1990, No 2, pp 24-34.

14. NAUKA V SSSR, 1989, No 6, pp 95-99.

15. TIME, 15 January 1990, p 41.

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#### Confidence Between Navies: Less Skepticism

914K0016C Moscow SSHA: EKONOMIKA, POLITIKA, IDEOLOGIYA in Russian No 1, Jan 91 (signed to press 28 Sep 90) pp 64-67

[Article by Vladimir Petrovich Kozin, candidate of historical sciences, senior scientific associate at the Diplomatic Academy of the USSR Ministry of Foreign Affairs, deputy chairman of the Group for Public Oversight of USSR Naval Reductions, and bureau member of the Presidium of the Soviet "Peace in the Oceans" Committee]

[Text] On 3 September 1990 at an airport in the Moscow suburbs, at 22:26 Moscow time, the IL-62 taxied onto the runway. After a brief take-off run, we were in the air and on our way to Vladivostok. We were a group of retired officers and civilians bound for the famous city by the Bay of the Golden Horn: members of the Soviet Committee for Peace, Disarmament, and Ecological Safety in the Seas and Oceans (abbreviated as SKMO—the Soviet "Peace in the Oceans" Committee) and the Group for Public Oversight of USSR Naval Reductions (GON VMF), which is part of the SKMO and was established in 1989 to conduct random inspections of the withdrawal of ships and submarines from the fighting forces of the Soviet Navy. In October 1989 and in September 1990 the GON VMF had already overseen the withdrawal of diesel-powered submarines of the Golf class with nuclear ballistic missiles in the Baltic Sea.

The original purpose of our "landing operation" was the discussion of the establishment of a public organization in Vladivostok like the SKMO and a public inspection of the withdrawal of the cruiser "Admiral Senyavin" from the naval forces. After we had arrived, however, we learned that two other important items had been added to our itinerary. But I will tell the story from the beginning.

Knevichi Airport near Vladivostok greeted us with sunshine and weather that could even be called hot—up to 25 degrees in the shade—in comparison with the cold in Moscow, and Vladivostok itself greeted us with a vibrant poster saying: "Running is not the latest craze. Running is a matter of human health."



Our first contacts were with representatives of civilian occupations. The talks on the establishment of a committee or association in Maritime Kray for a peaceful and ecologically clean ocean and on cooperation with the Russian-American University,<sup>1</sup> which were held in the Dalryba All-Union Fishing Association of the Far Eastern Basin, in the Far Eastern Shipping Lines, and in the Maritime Peace Committee, gave us reason to feel optimistic.

Our talks with naval officials were also constructive: In the headquarters of the Pacific Fleet (TOF), on our combat ships, and with Admiral G.A. Khvatov, TOF commander. They listened with interest to all of our requests and promised to assist us in every way possible in the completion of the SKMO and GON VMF mission. We saw several times in the next few days of our stay that they meant every word they said. The mutual understanding both sides endeavored to reach was useful and constructive. And why not? A sea power cannot exist without a reliable modern navy, but the navy also needs public support. At any rate, this is the case in many sea powers. This idea was uppermost in our minds during all of our explanations of the aims and objectives of the SKMO and GON VMF, which support reasonable reductions of naval arms in the world ocean on a balanced and mutually acceptable basis, with a view to the factors determining the global and regional strategic situation and the balance of power on the seas, based on the principle of equality and equivalent security, and under governmental and public supervision.

The morning of 6 September was appropriately sunny. After a 2-hour bus ride, we finally arrived at the site of our long-awaited goal: the naval unit where the cruiser "Admiral Senyavin" was berthed. After a brief stop at the regimental command post, where the bell from the cruiser is already hanging, we boarded the ship. It is a "grandfather," because 36 years of service is a ripe old age for a combat ship. It was moored alongside a new generation of large ASW ships and guided missile cruisers. The cruiser, which was named after the well-known Russian naval commander and was now leaving the Navy, had seen much—the Pacific and Indian oceans, numerous maneuvers, and combat operations leaving a long wake in history.

Officers and sailors stood in faultlessly straight lines on both sides of the deck. They were waiting for us. They honored us by inviting us to join them in formation. A ceremonial rally, including speeches by naval representatives and by a representative of the SKMO and GON VMF, was followed by the terse command: "Lower the flag and jack!" I checked the time: It was 11:50. The band played the "Welcoming March." As the symbols dear to the heart of each sailor were lowered, the majestic notes of the Soviet national anthem soared over the bay. It was an unforgettable moment. A solemn and simultaneously sad moment. Some sailors had tears in their eyes. "I am sorry to see the 'Senyavin' go," I was told later by Warrant Officer A.A. Khomuta when I was introduced to the crew of the cruiser.

In all, as Rear-Admiral V. Kasatkin, a Defense Ministry spokesman, said just before the ceremony, 16 ships and submarines will be withdrawn from the TOF forces this year. All of them will be destroyed in line with the unilateral reductions of the USSR Armed Forces, although they, like the "Admiral Senyavin," could continue to be used for some time. The physical wear on the hull of the "Senyavin," for example, was equivalent to less than 1 percent during its long years of service. "It could have been re-equipped as a training vessel," a captain 2d rank from the "Senyavin" said. For him, the cruiser represented his work and, on long cruises, his home. I would like to use this opportunity to support the sailors' proposal that the name of the cruiser "Admiral Senyavin" be given to a new ship.

Of course, we have to remember that the reduction of the USSR Navy's ships is not an endless one-way street, particularly in view of the asymmetry of naval arms: The West is superior in terms of many parameters of naval strength. Because of the different approaches of many leading sea powers, balanced reductions of naval arms are still "outside" official international negotiations.

Promises, however, have to be kept. Finally, there is also the matter of "good-example diplomacy." This is why the cruiser "Admiral Senyavin" was withdrawn from the Soviet Navy. The public inspectors verified that engines and armaments had been dismantled and the cruiser was completely disabled. We were told that it would be turned in as scrap metal. This is also easily verifiable.

The events in and around the Persian Gulf, which were caused by Iraq's aggression against Kuwait and required the concentration of sizable Western naval forces in this explosive region, do not appear to have influenced the program of unilateral reductions of Soviet naval ships: According to the data of the General Staff of the USSR Navy, 71 surface ships and submarines in all will be scrapped in 1989 and 1990.

Now I have to say a few words about the additions to our itinerary on the Pacific Coast.

First of all, the trip to Vladivostok provided a chance to address the second international conference of representatives of the Asian and Pacific countries, the keynote of which was "The Asia-Pacific Region: Dialogue, Peace, and Cooperation." To strengthen friendly ties with Japan, at this meeting we proposed the conclusion of an agreement with this country on the prevention of incidents in the open sea beyond the outer limits of territorial waters and in the airspace above, by analogy with the agreements the USSR has signed with some sea powers (the United States, Great Britain, France, and others), and suggested an exchange of visits by the naval ships of the USSR and Japanese navies to each other's ports.

Second, the trip to the port city by the Bay of the Golden Horn was my first chance to go on board some Soviet ships and even two American warships—the guided missile cruiser "Princeton" and the guided missile frigate "Reuben James,"<sup>2</sup> which sailed into Vladivostok

under the flag of Admiral C. Larson, commander of the Pacific Fleet of the U.S. Navy, for a friendly visit in response to the visit by a task force of USSR TOF ships to San Diego on the Pacific Coast of the United States in summer 1990 (I wish to use this article in SSHA: EKONOMIKA, POLITIKA, IDEOLOGIYA to thank Admiral C. Larson, Commander E. Honts of the "Princeton," Commander J. Day of the "Reuben James," and their crews for the chance to board these ships and to get answers to all of my questions).

The tour of the cruiser and frigate left a lasting impression: The American officers showed us virtually all of the important areas on these two best ships of the U.S. Navy's Pacific Fleet. There was a polite refusal to show only the missile launching system on the "Princeton" (we were shown the "missile room" on the frigate). As for the standard U.S. Navy rule to "neither confirm nor deny" the presence of nuclear weapons on board ships and submarines, Admiral Larson remained true to it: At a press conference he neither confirmed nor denied the presence of nuclear weapons on the cruiser and frigate visiting Vladivostok.

**Should the ships of nuclear powers carry nuclear weapons on friendly visits to each other's ports?** Today this question seems completely valid.

In any case, the visit of the two ships to Vladivostok was a success. This visit, Admiral Larson said soon after he disembarked, will help to build bridges of friendship and mutual understanding between the navies and peoples of the United States and USSR. Similar views were expressed in the response to his speech by his Soviet colleague, Admiral G.A. Khvatov. The underlying theme of their speeches was obvious to everyone: less confrontation, more mutual understanding, and the effort to be more friendly and tolerant.

The hosts—the sailors and the "city fathers"—did everything within their power so that the guests would have only the best memories of their visit to Vladivostok (which was, incidentally, the first visit by American ships in the last 53 years). "This was an unforgettable meeting," Petty Officer 1st Class Ken Davis from the frigate declared. "The inhabitants of the city were hospitable, friendly, and congenial," he added with a smile.

His praise is consistent with the facts. I witnessed many examples of hospitality in Vladivostok. Officers and sailors were treated to ice cream and something a little "stronger" and were assisted in their shopping for Soviet military memorabilia (the fleet department store had to close this section "for inventory" 3 days after the visit). Here is another example. A group of American sailors asked for a few additions to the short phrase book they had been issued when they left for the city, containing phrases of this kind: "I am an American sailor. I am lost and do not speak Russian. Take me to my ship." Their request was satisfied with the addition of these words: "You are a pretty girl. I like you."

And the people of Vladivostok liked the American sailors. Their neat snow-white uniforms and their sociable nature impressed many. Of course, not everyone was able to board the American ships to shake hands with the guests. Time was limited: The number of people wishing to board the ships was clearly higher than the number that could be accommodated in the 4 full days of anchorage.

**Would it be worthwhile to increase the number of these visits and the length of the ships' stay in each other's ports?**

Obviously, civilian tours of the ships are not the only reason for the exchanges of visits. They strengthen mutual trust in the sailors as well, heighten their sense of traditional naval solidarity, and enhance their professionalism and experience in interpersonal communication. I will never be able to look at Soviet sailors through the cross hairs of a gun sight again, one of the officers from the "Princeton" said. His Soviet colleague from the big ASW ship "Admiral Vinogradov" will never have this wish again either after visiting the naval base and port of San Diego.

**Is it possible that the Soviet Union and the United States (and other sea powers) might go beyond exchanges of friendly visits by naval ships?** For example, they could arrange for mutual brief tours of duty for officers in each other's naval headquarters, on ships, and in naval academies. The initial reaction of Soviet and American sailors to this suggestion was positive. "This sounds very interesting," said my new friends—a U.S. Navy public liaison officer and a captain 2d rank from the destroyer "Boyevoy." Even if this idea might sound utopian to some people today, tomorrow.... Anything can become a reality if there is a mutual desire to meet halfway.

Vladivostok in September certainly left many impressions. Will the meetings in this city, which was once off limits to foreigners, represent another stage in the efforts to build confidence between navies? The number of skeptics who feel that confidence is unattainable in the naval sphere appears to be dwindling with each day.

#### Footnotes

1. The Russian-American University is an international non-governmental organization established in June 1990. Its main purpose is the development of constructive dialogue and mutually beneficial cooperation between the Soviet and American people in various fields of knowledge and foreign economic activity.

2. The guided missile cruiser "Princeton," named after the site of the Americans' battle with British troops in January 1977, is the 12th cruiser of the Ticonderoga class. It has been part of the Pacific Fleet of the U.S. Navy since 1 February 1989. It weighs 9,500 tons, is 172 meters long and 16.8 meters wide, and has a crew of 370. It is equipped with the Aegis multi-purpose targeting and fire control system. The cruiser is armed with two quad launchers for Harpoon antisubmarine missiles, two light

gun mounts, two torpedo launchers, two standard anti-aircraft missile launchers, and other systems. The guided missile frigate "Reuben James" is named after a brave American sailor who served on various U.S. ships in the late 18th and early 19th centuries and shielded his commanding officer with his own body in battle. It has been part of the U.S. Navy since 22 March 1989. It weighs 3,800 tons, it is 135.6 meters long and 13.7 meters wide, and it has a crew of around 200. It is armed with a Harpoon missile launcher, two torpedo launchers, a dual-purpose artillery mount, and other systems.

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### NATO's Nuclear Dilemma

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[Review by V.G. Glebovich (Sverdlovsk) of book "Modernizing NATO's Nuclear Weapons" by Oliver Ramsbotham, Oxford Research Group, London, The Macmillan Press Ltd., 1989, xx + 257 pages]

[Text] The USSR-U.S. treaty on the elimination of medium- and shorter-range missiles provided mankind with an opportunity for genuine advancement toward a safe world, free of the threat of nuclear annihilation. In addition to this, the INF Treaty raised serious questions connected with long-range approaches to nuclear weapons within the context of prevailing worldwide and intra-Atlantic tendencies, the new realities of East-West relations, and the strategic balance in the world. The plans to modernize NATO's nuclear weapons occupied a special place among the issues discussed in the United States. This is also the topic of the studies of the independent Oxford Research Group that were compiled in this book by O. Ramsbotham, research fellow in the Bradford University School of Peace Research.

Different modernization options envisage the equipping of NATO with American sea-launched cruise missiles; the development of a new dual-purpose airplane for forward basing in Europe; the deployment of new nuclear bombs in Europe for use from planes flying at low altitudes; the development of a new longer-range tactical missile; the replacement of France's Pluto missile with a longer-range missile; the modernization of French ballistic missiles; the modification or replacement of the Lance missile with a nuclear version of the American tactical missiles launched with the MLRS system for conventional missiles; and the creation of a reserve of new neutron ammunition in Europe for the Lance missile and atomic artillery. The modernization process will also presuppose the development of the nuclear component of dual-purpose weapons, the reduction of the cost of weapons and the enhancement of their interchangeability, the augmentation of military planning and flexible response capabilities, the complication

of assessments of the actual U.S. nuclear arsenal, and the more even distribution of nuclear weapons on the territory of allies.

Leaving the military aspects of modernization aside to discuss its political significance, Ramsbotham underscores the fact that the United States and its NATO allies are still acting primarily on their allegiance to the "nuclear deterrence" theory, in accordance with which nuclear weapons are assigned the decisive role in preventing war. People in NATO hope to enhance the effectiveness of the theater nuclear weapons remaining after the INF Treaty so that they "can continue to play a significant role in the defense of the alliance and in deterrence in the next century" (p 15).

The book describes how NATO is striving to perform deterrence and defense functions and strengthen the alliance and is promoting disarmament talks but is also trying to strengthen "NATO's European pillar" in case of a weaker American military presence in Europe in the atmosphere of the complex interaction of military, political, economic, psychological, and even symbolic factors connected with nuclear arms.

The author must be given credit for an impartial and generally accurate comparison of the views of modernization's supporters and opponents. In this book, prominent politicians and former military leaders from the United States, Great Britain, the FRG, and other countries dispute the existence of the "Soviet military threat" and point out differences of interpretation in the USSR and the United States and in the European capitals and Washington with regard to European security issues. The focal point of the criticism is the theory of "nuclear deterrence" itself, as an illusory and dangerous theory calling for preparations for nuclear war and the start of this kind of warfare in times of crisis and thereby coming into conflict with NATO's officially declared goal of preventing war. The warnings of former U.S. Secretary of Defense R. McNamara are relevant in this context. He criticized the plans for the use of battlefield nuclear forces and stressed that this kind of war would certainly spread from the battlefield to the rest of Western Europe and probably to Eastern Europe (p 36).

Ramsbotham cogently demonstrates that the augmentation and improvement of arms in NATO are accompanied by a stronger awareness of the need to settle crises by political means. Modernization, the author writes, would strengthen the connection between nuclear and conventional arms, heighten the risk of nuclear conflict, and complicate the verification of the observance of arms limitation treaties and agreements. The opponents of modernization are completely justified in believing that the very presence of nuclear weapons on the continent virtually precludes lasting security and stability in Europe, has a negative effect on achievements in the sphere of disarmament, and seriously impedes the further development of this process.

Ramsbotham analyzes the NATO organizational structures responsible for making the main decisions on nuclear weapons and the political landscape within the North Atlantic alliance. According to Ramsbotham's analysis, only the United States, Great Britain, and Italy (as well as France, which is not a member of the NATO military organization) officially support the modernization of tactical nuclear weapons. Plans for the improvement of these weapons, which can only be categorized as tactical with major reservations in most of densely populated Europe, have evoked negative responses from Holland and Greece, and especially from the FRG. Denmark, Iceland, and Norway worry about the escalation of the arms race at sea as a result of the possible assignment of American sea-launched cruise missiles to the alliance. Opposition to NATO's plans is perceptible in Belgium, Canada, Spain, and Portugal.

Today, in contrast to the 1970s, virtually all of the main opposition parties in the majority of states party to NATO's nuclear program are demanding radical steps toward nuclear disarmament. Furthermore, the opponents of modernization are questioning the permanence of American "nuclear guarantees" and Atlantic solidarity, proposing the negotiation of deeper cuts of conventional offensive arms in the European theater (including Soviet tanks and artillery) and a global ban on chemical weapons.

Some members of NATO circles, most of whom support the idea of modernization, are also expressing their doubts that suggested measures will secure adequate substitutes for the systems eliminated by the terms of the INF Treaty, and the fear that the naval element of modernization, cruise missiles, will weaken incentives for the development of ground-based weapons and diminish the operational flexibility of the U.S. Navy.

In a description of the workings of NATO mechanisms, the author says that decisions on nuclear arms are made in a variety of civilian and military links of the bureaucratic structures of NATO countries. The decision-making process is not controlled completely by the officials responsible for the decisions in the United States, it has been almost monopolized by the comparatively small intellectual elite in France, and it is most compact in Great Britain, where the entire system is controlled by individuals in high-level positions in the government and armed forces.

Preparations for the main decisions are made in advance by members of national military structures and the non-elected NATO staff, and the decisions then take on a life of their own and are difficult to change at meetings of the NATO heads of state and government. Former Prime Minister P. Trudeau of Canada said something warranting consideration in this context when he admitted that "any attempt to begin discussing or to question the significance of communiques prepared in advance at summit NATO conferences arouses strong resentment and intense opposition" (p 151).

The author's sincere desire to analyze NATO decisions objectively and thoroughly, with a view to political traditions and realities, cannot be denied. He is correct in naming government secrecy as one of the most serious obstacles to the restructuring of the international security system for the purpose of reducing its dependence on nuclear weapons. This is the topic of a separate analysis in the book. NATO planners, for example, try to limit the participation of national parliaments in military policymaking by concealing information, evading financial control and parliamentary audits, and resorting to the classification of weapons systems during the early stages of their evolution, using this practice widely in the struggle against internal opposition. Furthermore, there is the assumption that the USSR had stronger control over its nuclear forces and deployed less of its nuclear weapons on the territory of its allies than the United States. NATO planners assert that the structure of decisionmaking in NATO is less centralized and more democratic than in the Warsaw Pact and the Soviet Armed Forces. Despite the controversial, and in some cases the justifiable, nature of these statements, the very fact that these issues are being raised provides objective evidence of the considerable potential of Soviet initiatives of recent years. Apparently, it would be best for the USSR to make decisions on nuclear weapons more public, as an effective means of strengthening strategic stability and mutual trust.

Ramsbotham stresses that excessive secrecy not only complicates accurate public perceptions of decisions, but also contributes (as the example of Great Britain illustrated) to the spread of departmental abuses of authority, the polarization of opinions, and the politicizing of government structures, including military structures, destabilizes political processes, and jeopardizes the security of NATO states. To prevent war, the Western governments, in his opinion, should strive to increase the number of public debates and enhance the quality of parliamentary investigations of decisions in addition to gradually reducing the role of nuclear arms in military planning. In general, these recommendations also seem completely applicable to us.

Not all of the author's conclusions are indisputable, however. For example, although Ramsbotham admits the relevance of the search for alternatives to "nuclear deterrence," he expresses the opinion that "the appeals for immediate disarmament ignore the historic role nuclear arms are still playing" (pp 100, 229). In essence, he agrees with the members of the Western scientific and political community who were firmly convinced of the peace-keeping functions of nuclear weapons until recently. The central question of NATO's nuclear dilemma remains unanswered in the final section of the book: Would it be better for the North Atlantic alliance to choose the traditional response to "Gorbachev's challenge" and not deviate from programs for the modernization of European theater nuclear forces, or to try to find "a way out of the arms race" (pp 241, 242).

These shortcomings, however, do not obscure the main idea expressed by the author, who believes that the appearance of new generations of nuclear arms requires moral judgment. He advises the renunciation of obsolete stereotypes and the acceptance of the new political thinking, which would aid in the complete elimination of nuclear weapons (p 90).

Ramsbotham's book underscores the relevance of initiatives and proposals envisaging the gradual equalization and reduction of levels of military confrontation involving nuclear and conventional arms in Europe to the minimum agreed level of reasonable sufficiency.

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### Articles Not Translated

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